

AMATEUR SATELLITE REPORT

AMSAT's Newsletter for the Amateur Space Program.



Amateur Satellite Report is endorsed by the
American Radio Relay League as the special interest
Newsletter serving the Amateur Radio Satellite Community

Number 93
December 31, 1984

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Short Bursts

- Shigetake Morimoto, JA1NET, Chairman and President of JAMSAT died at 0800 UTC, 21 Dec 84. He was 76. The venerable leader of JAMSAT and Chairman of JARL's JAS-1 satellite committee had been ill for several months. According to JA1ANG, he was very actively engaged in the satellite project until about one month ago when his health turned for the worse. Services were scheduled for 26 Dec in Nakano, Tokyo. AMSAT has expressed its sympathy on behalf of all its members.

- New Area Coordinators appointed recently include Butch Mason, W6KAG for Southern California and Gerd Schrick, WB8IFM, Eric Rosenberg, WA6YBT and Kenneth Tessner, N8AEG all Assistant Area Coordinators for the Dayton Ohio District. In Northeastern Ohio, Dave Kifer, N8ETY has been appointed Area Coordinator. Congratulations to all the new appointees! So nice to have you all aboard.

- AMSAT's new mainstream publication is AMSAT SATELLITE JOURNAL. ASJ or simply Satellite Journal will be in the mail by mid-January. Meanwhile, ORBIT -19, a collector's item, is in the mail now and should be in your hands soon. Winner of the 'Name the Magazine Contest' is Andy MacAllister, WA5ZIB.

- Comet AMPTE was due over the Eastern Pacific (9 deg S, 84 deg W) Christmas morning. How many readers saw it? Reports and comments invited.

- One of the most active speakers in AMSAT's treasure trove of talented talkers is Ohio Area Coordinator Dick Burggraf, W8PGP. Dick recently gave two presentations in Ohio. One was to the Goodyear Atomic Amateur Radio Club (an AMSAT affiliated club) and the other was to the Scioto Valley ARC. Dick is a Goodyear retiree. Nice job, Richard!

- The contract between AMSAT and the European Space Agency, ESA, has been signed. That means we are now on our way towards a SECOND Phase III satellite, Phase IIIC. The P3C bird may have some exciting add-ons in addition to the anticipated Mode B and Mode L transponders. One of the possibilities is that of a high power version of Mode L that will reduce overall link requirements. Increasing the downlink power may reduce ground system requirements on both the uplink and downlink to a degree. Also looming large for P3C is a digital Mode L transponder and an S-Band beacon at 2.3 GHz. Construction now begins in Marburg, Washington and Boulder for the anticipated June 86 launch of the bird. Still to be finalized is the propulsion

system to be employed. It could be an experimental plasma system, a hypergolic system as with AO-10 or a solid fuel rocket as was used with P3A. Full scale campaign begins in January 1st!. Also aboard the huge Ariane 4 will be RACE's Arsene Amateur Radio satellite.

- AMSAT's Dayton Hamvention Committee headed up by W8GQW has issued a call for papers for the 1985 version of the Hamvention. Please provide an abstract of your paper or at least the subject and title to AMSAT HQ, P.O. 27, Washington, D.C. 20044 as soon as possible. No final cutoff date had been established at presstime.

- The Space Activist News was kind enough to announce AMSAT's AGM in their 31 Oct issue. Inquiries about the publication may be made to 2033 Parker St., Berkeley, CA, 94704.

New Sideband Technology On AO-10

Experiments using the newest techniques in analog voice processing, Amplitude Compandered SideBand, ACSB, will get under way in earnest in late December with AO-10 being one of the main test venues. ACSB is a technique which first compresses the speech at the source and then expands it at the receiver. Thus COMPRESS and EXPAND yields COMPANDER. Improvements in signal to noise ratio of 15 dB or more are claimed. The tests will aim to find what benefits can be derived using ACSB with AO-10. Early tests from ARRL HQ last month began the Project Companion Phase 1 tests. Project Companion is a joint project of AMSAT, ARRL and Project OSCAR which aims to bring this very important technology to the Amateur Radio community at the earliest opportunity. According to Paul Rinaldo, W4RI, a surprise bonus of the ACSB technique was the virtual elimination of the annoying effects of spin modulation on AO-10. Paul explained to ASR that the introduction of a 3.1 kHz pilot tone at the source provides an index to the amount of compression employed. The ACSB receiver compensates for the effects of spin modulation by changing the expansion function according to the strength of the received pilot tone. The pilot also affords a very tractable AFC function to negate Doppler shift effects for a while. All told, ACSB may bring OSCAR communication a lot, lot closer to the armchair-style copy many expect but which cannot now be afforded of AO-10 given the link budgets and user population evident. What is yet to be reckoned, according to

Engineering VP, W3GEY, is the effect on transponder peak power versus average power (a significant parameter) should many SSB stations use ACSB on AO-10.

The ACSB radios forming the central elements of the experimental apparatus for Project Companion are modified commercial radios manufactured by Sideband Technology, Inc, formerly of Rochester, N.Y. The company has since been acquired and relocated to North Carolina. ARRL has purchased about 60 surplus ACSB radios from STI for use on Project Companion. These radios can be modified to work in the amateur 2 meter band but are presently crystal controlled. ARRL will announce shortly the price of a kit of materials for would-be ACSB experimenters. The kit consists of a fully populated, operational ACSB audio board and RF board. A comprehensive documentation package accompanies the kit. The price will be in the \$60 range and the kit is the experimenter's to keep.

If you wish to apply for one of these kits, simply write to WA2LQQ, P.O. Box 177, Warwick, N.Y. 10990 with the following. First, a short (a paragraph or two) proposal or explanation of what or how you will do with the ACSB radio. Next, you promise to file a report on the results of your experiments and to participate in Project Companion by putting the radio on the air and joining in with others doing likewise. Finally, you should enclose an SASE so we can contact you when the radios are ready for shipment. Overseas shipments will require special provisions.

Project OSCAR Orbital Predictions To Be Printed

Project OSCAR, Inc, is preparing a new set of orbital predictions for 1985. The predictions will provide the UTC times and longitude for all south to north equatorial crossings of the four Russian satellites carrying Mode A transponders (RS5, 6, 7 and 8). Additionally, the UTC time, sub-satellite latitude and longitude and argument of perigee will be provided for each apogee of AMSAT OSCAR 10 (AO-10). Used with an appropriate plotter, the document the user will be able to determine his access time to all the presently available Amateur Radio satellites carrying active transponders. A minimum donation of \$10.00 is required for these comprehensive databooks for shipment to North America. Elsewhere the minimum is \$12.00. To order you copy, send you check or money order (in U.S. Dollars only please) along with your name and address to: Project OSCAR, P.O. Box 1136, Los Altos, CA 94022. The books will be shipped in January. Show your support for this fine effort today. In the past Project OSCAR has donated thousands of dollars to AMSAT for important projects. Now let's get behind this worthy project ourselves!

AO-10 RTTY Format Delineated

On 3 Sep 84 a new beacon system was implemented on AO-10 which included for the first time an RTTY transmission. This signal coded key spacecraft operating conditions in a format convenient for many Amateurs not equipped with the PSK decoders used by the command stations and

a fortunate few others. Now comes word on how to decode the RTTY telemetry being heard both on Mode B at 15 and 45 minutes past the hour and on Mode L at 0, 15, 30 and 45 minutes past the hour. There are 4 beacons on AMSAT OSCAR 10:

Mode B General Beacon: 145.810 MHz
Mode B Engineering Beacon: 145.987 MHz

Mode L General Beacon: 436.020 MHz
Mode L Engineering Beacon: 436.040 MHz

Currently the Mode B General Beacon and the Mode L Engineering Beacon are in use. Listen for the RTTY telemetry there. According to command station VE1SAT/VE6, the so-called "Z" block sent as RTTY is a version of the "Y" block telemetry sent via PSK. Thus many of the key operating parameters are now available for general consumption to anyone who has 45 baud baudot RTTY demodulation and display capability.

The exact baud rate is 50 rather than the 45 baud (60wpm) standard but most electronic and mechanical machines equipped to receive 45 baud will respond well to 50 baud. The AO-10 RTTY telemetry is sent in FSK with 170 Hz shift and is standard baudot (5-level) coded.

The following table exemplifies the format of the RTTY as one might see it printed or displayed on a RTTY machine or computer VDU. The telemetry channels will appear as six rows (lines) of 10 columns thus:

	1	2	3	4	5	6	7	8	9	10
A										
B										
C										
D										
E										
F										

According to command station ZL1AOX, each of the 60 telemetry cells or channels is sent as a 1, 2 or 3 character numeric group such as "1", "16" or "165". The entire sequence begins with an identification such as:

HI HI THIS IS AMSAT OSCAR 10

This is followed by the UTC time in the standard HH:MM:SS format. Next is the AMSAT day number where day 1 equals 1 Jan 78. This is followed by three hexadecimal numbers denoting safety information, transponder status and command serial number. Next are 7 decimal numbers which indicate the IHU multiplexer status. The block of 60 telemetry channels then follows 4 blank lines.

Tlm Row/ Col	Meaning	Equation	Units
A1	Solar panel out and BCR input voltage	$n \cdot 150$	mV
A2	70cm xmtr average power output	$(253-n)^2/2000$	W
A3	70cm rcvr temperature	$(n-127)/1.82$	C
A4	Nutation dampner temperature	$(n-127)/1.82$	C
A5	BCR output and main battery voltage	$(n-10) \cdot 75$	mV
A6	Special purpose	xxxxxxxxxxxx	-
A7	70cm xmtr temperature	$(n-127)/1.82$	C
A8	14 volt rail current to xponder	$(n-15) \cdot 20.64$	mA
A9	10 volt regulator voltage	$(n-12) \cdot 50$	mV
A10	He tank pressure at hi pres regulator	$(n-34) \cdot 44.46$	bar

B1	IHU temperature	$(n-127)/1.82$	C
B2	14 volt rail current to magnetorquers and antenna relay	$(n-15) \cdot 4.128$	mA
B3	BCR #1 status	0 = Off; N > 10 = On	-
B4	He tank pres at low pres regulator	$(n-37) \cdot 0.8$	bar
B5	BCR temperature	$(n-127)/1.82$	C
B6	10 volt regulator current	$(n-15) \cdot 4.128$	mA
B7	BCR #2 status	0 = Off; N > 10 = On	-
B8	Not used	xxxxxxxxxxxx	-
B9	SEU temperature	$(n-127)/1.82$	C
B10	Battery charge current	$(n-15) \cdot 10.32$	mA

C1	Top photocell sensor	65 means sun normal to Z (spin) axis; 20-30 nominal	-
C2	Special purpose	xxxxxxxxxxxx	-
C3	Main battery case #1 temperature	$(n-127)/1.82$	C
C4	Active BCR output current	$(n-15) \cdot 20.64$	mA
C5	Bottom photocell sensor	(same as C1)	-
C6	Kick motor strut temperature	(Inoperative)	-
C7	Main battery case #2 temperature	$(n-127)/1.82$	C
C8	Active BCR input current on 28 volt line	$(n-15) \cdot 10.32$	mA
C9	Spin rate {if n < 139, or if n >= 139	$r = (139-n) \cdot 0.8 + 20$ $r = 508/(n-116) - 2$	rpm
C10	24cm rcvr AGC {if n < 100 or if n >= 100	AGC = 0 AGC = $(n-100)^2/189$	dB

D1	Auxillary battery temperature	$(n-127)/1.82$	C
D2	Solar panel #6 current	$(n-15) \cdot 4.128$	mA
D3	2m xmtr average power output	$(200-n)^2/2000$	W
D4	He tank temperature	$(n-127)/1.82$	C
D5	Solar panel #1 temperature	$(n-127)/1.82$	C
D6	Solar panel #5 current	$(n-15) \cdot 4.128$	mA
D7	70cm rcvr AGC	$(n-83)^2/1000$	dB
D8	70cm xmtr temperature	$(n-127)/1.82$	C
D9	Solar panel #3 temperature	$(n-127)/1.82$	C
D10	Solar panel #4 current	$(n-15) \cdot 4.128$	mA

E1	Special purpose	xxxxxxxxxxxx	-
E2	24cm rcvr temperature	$(n-127)/1.82$	C
E3	Solar panel #5 temperature	$(n-127)/1.82$	C
E4	Solar panel #3 current	$(n-15) \cdot 4.128$	mA
E5	14 volt regulator voltage	$(n-10) \cdot 61.5$	mV
E6	Wall temperature in arm #3	$(n-127)/1.82$	C
E7	Top surface temperature of arm #1	$(n-127)/1.82$	C
E8	Solar panel #2 current	$(n-15) \cdot 4.128$	mA
E9	Internal 9 volt bus from transponder	$(n-10) \cdot 50$	mV
E10	Wall temperature in arm #2	$(n-127)/1.82$	C

F1	Bottom surface temperature of arm #1	$(n-127)/1.82$	C
F2	Solar panel #1 current	$(n-15) \cdot 4.128$	mA
F3	Special purpose	xxxxxxxxxxxx	-
F4	Wall temperature in arm #1	$(n-127)/1.82$	C
F5	N2O4 tank temperature	$(n-127)/1.82$	C
F6	UDMH tank temperature	$(n-127)/1.82$	C
F7	Auxillary battery voltage	$(n-10) \cdot 75$	mV
F8	Central supt cylinder temp near arm #1	$(n-127)/1.82$	C
F9	Earth sensor temperature	$(n-127)/1.82$	C
F10	Mode L xpndr 9 volt regulated line	$(n-10) \cdot 44$	mV

NOTES:

B1: IHU = Integrated Housekeeping Unit; the computer

B3: BCR = Battery Charge Regulator

B4: He = Helium

B9: SEU = Sensor Electronics nt

C: Direct from solar panels

F5: N2O4 is nitrogen tetroxide; the propellant oxidizer

F6: UDMH is unsymmetrical di-methyl hydrazine; the propellant fuel

Compiled 10 Dec 84 by ZL1AOX, VE1SAT, KA9Q, DB5ER, R.Gape, WA2LQQ

UoSAT Bulletin-104 (Edited) 14th December 1984

UoSAT Spacecraft Control Centre, University of Surrey, England

GENERAL NEWS

UoSAT-OSCAR-11 Stabilisation

Automatic attitude control manoeuvres, carried out by the on-board computer over last weekend, have successfully restored gravity-gradient stabilisation to the UO-11 spacecraft. The spacecraft was inadvertently destabilised a month previously during a routine despin manoeuvre causing UO-11 to go into a complex tumbling motion.

Several weeks of navigation data analysis, followed by four days of autonomous attitude manoeuvres by the OBC were necessary to de-tumble the spacecraft and recapture gravity lock. The autonomous manoeuvres could be seen by those monitoring the multiple orbit magnetometer data surveys - the attitude algorithm was initiated after the first orbit displayed. Gravity lock, at present, looks even better than before - we shall try to keep it that way! We are back in business!

NOAA-9

NOAA-9 was launched at 10:42 gmt on 12 December - no additional information available at present.

UoSAT Bulletin-105 (Edited) 21st December 1984

UoSAT Spacecraft Control Centre, University of Surrey, England

GENERAL NEWS

1984

Thanks for all those who sent Xmas cards, it is nice to know you think of us! 1984 has been a hectic but rewarding year for all at UoS - having overcome the teething problems following the launch of UoSAT-OSCAR-11 in March, we have been most pleased with the spacecraft's performance. The gravity gradient stabilisation has operated extremely well (provided we do not 'kick' it too hard!) and a great deal of work is under way on the various experiments.

The DCE has been in use since May assisting spacecraft operations and is about to be activated as a communications experiment shortly in the new year - although initially in a limited experimental way only.

The Particle/Wave Experiment has carried out experiments in conjunction with the AMPTE spacecraft in November and more are scheduled for April 1985.

Test images have been received from the CCD camera on UO-11, but further work is required on the ground station facilities at UoS before this experiment can be fully evaluated. Considerable efforts are under way on the 9600 bps psk 435 MHz downlink with some success.

Although little has been seen from the Space Dust Experiment, a number of events were recorded in early December - coinciding with a meteor shower. This data is still being analysed.

The OBC has been used continuously to provide autonomous attitude control; whole-orbit experiment and telemetry data surveys; automatic experiment and downlink switching and special experiment support.

The telemetry, telecommand and power systems continue to perform well. The programmable channel 'dwell' facility on the telemetry has been used frequently for attitude control navigational support.

The UoSAT Team would like to thank the very many experimenters world-wide for their support and regular reports on the spacecraft - they are much appreciated.

UoSAT-OSCAR-9 has had a good year too - supporting a regular experiment schedule and, of course, the Bulletin! The UO-9 schedule is likely to be modified in the New Year to reflect user interests.

The UoSAT Team do, however, suffer increasing manpower problems. Operating two spacecraft - as well as planning future missions - is VERY labour-intensive and there is much we cannot do, due to resource limitations, which we would like to be able to do! We are trying to improve this situation but it will take time. 1985 promises to be a busy year too - more experiments on UO-11 and preparation for PACSAT and other missions - we are looking forward to another exciting year!

NOAA-9

NOAA-9 was launched at 10:42 gmt on 12 December - no additional information available at present except that the launch appears to have been successful and signals from NOAA-9 have been received at UoS on 191284.

UoSAT-Oscar-9 Schedule

This weeks schedule will be modified as follows due to Xmas:

Friday 211284 - load Bulletin

Saturday 221284 - Bulletin/DIGITALKER/1200 bps telemetry until Wednesday 020184

(The 21 MHz Beacon will be in use during this time.)

UoSAT-Oscar-11 Operations

DAY	ORBIT	CHANNELS	RESET TIME
Friday	4203	2,3	11:51:49
(OBC told to change d/link from TLM to ODATA after 6hrs)			
Saturday		whole orbit data dump	
Sunday	4232	reset Watch-Dog ODATA dump	
	4233	2,3	13:00:10
	4237		
(OBC told to change d/link from TLM to ODATA after 1.5hrs)			
Monday	4245	1,2,3,52	08:47:02
	4246	despin	
	4247	despin	
	4252	2,3,	20:02:00
(OBC told to change d/link from TLM to ODATA after 2.5hrs)			
Tuesday	4261	despin	
	4262	despin	
	4266	2,3,	19:01:16
(OBC told to change d/link from TLM to ODATA after 6hrs)			
Wednesday	4275	despin	
	4276	despin	
	4282	1,2,3,52	21:18:02
(OBC told to change d/link from TLM to ODATA after 1.5hrs)			
Thursday	4290	despin	
	4291	2,3	12:21:55
		DCE tests	
Friday	4304	reset Watch Dog	
	4305	DCE tests	
		2,3	11:24:15

(Thanks for reports & questionnaire returns from I2KBD, ZL1MO, JA2WO, W.T.Smith, DL7OU)

Amateur Satellite Report is published and mailed First Class bi-weekly for the Radio Amateur Satellite Corporation. The purpose is to enhance communications about the Amateur Radio Satellite Program. Subscription rates for the United States, Canada, and Mexico are \$22.00; Foreign is \$30.00. The rate covers 26 issues (typically one year). Send check or money order in U.S. funds (drawn on U.S. banks only please) to "Satellite Report," 221 Long Swamp Road, Wolcott, CT 06716. Information contained herein may be quoted without permission provided credit is given to Amateur Satellite Report, Wolcott, CT 06716. Amateur Satellite Report is Copyright Protected and duplication of this publication in any way including by the photocopy process or by electronic means (computer data banks, etc.) is not permitted under any circumstances. Amateur Satellite Report is endorsed by the ARRL as the special interest newsletter serving the Amateur Radio Satellite Community. The editorial opinions expressed are not necessarily those of the ARRL.